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CAMEL

[*Prepared from the Material collected in connection with the Article "Camel" for the "Dictionary of the Economic Products of India."*]

BY

GEORGE WATT, M.B., C.M., C.I.E.,

REPORTER ON ECONOMIC PRODUCTS TO THE GOVERNMENT OF INDIA.

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PREFATORY NOTE.

IN connection with the preparation of the "Dictionary of the Economic Products of India," the undersigned had occasion to read through a large number of publications and Government Records regarding the Camel, and in some cases to peruse works not generally procurable in Indian libraries. This resulted in a series of notes which proved too voluminous for the space set apart in the Dictionary for the article on the Camel, but which, having been compiled, are published in a separate pamphlet for the use of any officials or others to whom the information may possibly be serviceable.

An Index is added giving the vernacular names of the plants described as Camel Fodders.

GEORGE WATT.

SIMLA,
September 30th, 1887.

THE CAMEL.

Camelus, *Linn.*

This genus of Ruminant Mammals contains only two Asiatic species—the Dromedary and the Bactrian Camel. It is by zoologists referred to the CAMELIDÆ, a family represented in the New World by the LLAMA and ALPACA and two or three nearly allied animals, all belonging to the genus AUCHENIA. The CAMELIDÆ, in many respects, constitute an aberrant group of the RUMINANTIA, especially in their dentition and in the peculiarities of their feet. The two hinder supplementary toes, present in most ruminants, are altogether absent in the CAMELIDÆ. The soles of the feet are covered by a callous, horny, integument, connecting the two toes upon which the animal walks. They have no horns, and the nostril can be closed at will, a provision against the dust-storms of the regions in which camels are chiefly found.

The Home of the Camel.

Habitat.—The two species—**Camelus dromedarius,** or the Arabian one-humped Camel, and **C. backtrianus,** or the Persian two-humped Camel—while very unlike each other are so nearly allied that the hybrid between them is fertile. But the progeny from the mule is said to be more unmanageable than the mule itself, and is accordingly very little bred. The Indian camel belongs to the former species, and, indeed, **C. dromedarius** is, by some writers, spoken of as the Indian, African, and Arabian camel. It is certainly found in all these countries, but in a state of domestication only, and seems to have accompanied the Muhammadans in their conquests, having been even taken to Spain by the Moors and to Pisa by one of the Dukes of Tuscany. More recently, the one-humped camel has been introduced to Australia and to New York, where it appears to have taken kindly to the sandy expanses of Nevada, a region in which thorny bushes abound, similar to those on which it browses in India and other warm countries. The Bactrian camel, on the other hand, requires a colder climate than the dromedary. The Russian Asiatic explorer, **Colonel Prejevalsky,** would appear to have discovered this animal east-south-east of Lob-nor, in what some authors deem a truly wild or indigenous condition, and others a naturalised state—an escape from domestication. Whichever view may be taken of this question, the Bactrian camel, in its domestication, is distributed from the point fixed by **Prejevalsky** as its indigenous habitat, throughout the region north and east of that inhabited by the dromedary, or from the Black Sea to China and northward to Lake Baikal. In Central Asia both species are found, as also the hybrid between them. There are numerous recognised breeds of both species, and there are even dromedaries so acclimatised to alpine rocky regions, that they are prized as beasts of burden by the inhabitants of such countries. The Bactrian camel is smaller than the dromedary, has longer, darker, and more plentiful hair, and the pads of its feet are much harder (an adaptation doubtless to the rocky region it inhabits) than those of the Arabian camel. **Palgrave,** however, informs us that dark-coloured or even black camels exist in Arabia, and that the term dromedary should be restricted to the pale-coloured, more elegantly-formed breed, which might be designated as the high-blooded race-horse of his species. According to some writers the camel is one of the oldest mammals now living, since fossil remains have been found in the Siwaliks of a species, which, but for its being a little larger than the Arabian camel, is scarcely distinguishable from it. How far this fact may be accepted as throwing light upon the original home of the animal is a matter of speculation. The Siwalik mountains, which skirt the foot of the Panjáb Himálaya, have now been satisfactorily established as belonging to the *pliocene* period

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of Geologists, although many earlier or *miocene* forms seem to have survived in the Siwalik pliocenes, just as many animal forms of the latter, including the camel, have continued to the present day. Thus wild camels may be accepted as having once upon a time existed in what is now Northern India, or in the region south of the present Himálayas; but at the present day the animal only occurs there in a state of domestication and need not by any means be the actual descendant of the Siwalik camel. It is remarkable, however, that no one has ever seen the one-humped wild camel in a wild state, and unless we are to accept the somewhat extreme view that they may after all be but varieties of one species (hence producing a fertile hybrid or cross-breed), **Prejevalsky's** home of the two-humped camel need have no bearing on the question of the nativity of the so-called Arabian camel.

Colonel Yule, in his most instructive "*Introductory Remarks*" to **Prejevalsky's** *Mongolia,* gives a valuable summary of the various references by authors to the wild camel. He says: "This is a somewhat interesting subject; for disbelief in the existence of the Wild Camel has been strongly expressed, and indeed not long since, by one of the greatest of scholars as well as geographical authorities on Central Asia. It is worth while, therefore, to observe that its existence by no means rests on the rumour heard by **Prejevalsky.** There is much other evidence; none of it, perhaps, very strong taken alone, but altogether forming a body of testimony which I have long regarded, even without recent additions, as irresistible.

"The following are the testimonies of which I have retained memoranda; but I believe there are several others in existence:—

"I.—**Shah Rukh's** ambassadors to China (*A.D. 1420*), midway in the Great Desert between Kamul and Shachan, or thereabouts, fell in with a wild camel (*see Cathay and the Way Thither, I., cc*).

"II.—The Persian Geography called *Haft-Iklím* (*The Seven Climates*), probably quoting from **Haidar Rázi,** says of the Desert of Lob: 'This Desert contains wild camels which are hunted' (*Notices et Extraits, &c., XIV., pt. i., 474*).

"III.—In **Duhalde** we find the following from Chinese sources: 'Both wild and tame camels are found in the countries bordering on the north of China. . . At present wild camels are only to be met with in the countries north-west of China' (*English folio ed., ii., 225*).

"IV.—In the *Journal of the As. Soc. of Bengal, IX., 623,* I see that **Sir Proby Cautley** quotes **Pallas** as arguing, on Tartar evidence, that the wild camel is found in Central Asia. **Cuvier** ascribes this to the Buddhist custom of giving liberty to domestic animals. This may have been the *origin* of the breed, as of the wild horses of S. America and Queensland, but we see above that they have been known for at least 450 years.

"V.—**Izzat Ullah,** who travelled as a 'Pundit' in the employment of **Moorcroft,** mentions that Khotan is said to abound in wild asses, *wild camels,* cattle, and musk-deer (*J. R. As. Soc., VII., 319*).

"VI.—**Mr. R. Shaw,** in his 'High Tartary': the Yoozbashee says they (lyre-horned antelopes) go in large herds, as do also *wild*

WILD CAMELS.

"VII.—**Sir Douglas Forsyth**, in a letter which he wrote to me from Shahidullah, on his last mission to Kashgar, mentioned that the officer who met them there had shot the wild camel in the desert of Turfán. It was a good deal smaller than the tame camel.

"VIII.—The same gentleman, in the printed report of his mission, gives more detailed evidence, apparently from another native informant.

"IX.—**Mr. Ney Elias** also received strong and repeated evidence of the existence of wild camels north of the Thian Shan 'from intelligent Chinese travellers, as well as from the native Mongols... Many of the former, who declared they had seen these animals between Kobdo and Ili, Uliassutai, and Kuchen, I questioned as to their being really wild, or having become so subsequent to domestication; but the answers were always emphatically that they had never been tame... Moreover, the wild camels were always described to me as smaller in size, and much darker in colour than tame ones' (*Proc., R. Geog. Soc., XVIII., 80*).

"X.—**Dr. Bellew** says: 'The deserts on the east of this territory, in the vicinity of Lob, . . . are the home of the wild camel. It is still, as of old, hunted there, and is described as a very vicious and fleet animal, and of small size, not much larger than a large horse. A Kirghiz shepherd, who had resided for some years at Lob, told me he had frequently seen them at graze, and had himself joined in many hunting expeditions against them for the sake of their wool, which is very highly prized for the manufacture of a superior kind of camlet' (*Kashmir and Kashgar, p. 348*).

"XI.—The Russian, **Father Hyacinthe**, in his Memoirs on Mongolia, speaking of Middle Mongolia, says that there are found *wild camels*, wild mules, wild asses, wild horses, and wild goats, especially on the more westerly steppes (*Denkwürdigkeiten über die Mongolei, p. 110*).

"XII.—**Captain Valikhanoff** says that Chinese works *very often* speak of wild camel hunts, which formed one of the amusements of the rulers of the cities of Eastern Turkestan in past ages, though he could not get information regarding the animals (*Russians in Central Asia, p. 141*).

"XIII.—Several additional testimonies will be found cited by **Ritter** (*iii., 341, 342*)."

Since the above was published by **Col. Yule**, **Prejevalsky** has himself shot the so-called wild camel near Lob-nor, so that it is now very generally accepted that a wild two-humped small and very woolly camel does exist in the region referred to.

Vernacular Names.—*Chameau*, Fr.; *Kameel*, Ger.; *Kamelos*, Gr.; *Camello*, It. and Sp.; *Camelus*, Latin; *Únt*, or *út*, Hind.; *Jamal* or *gamal*, Arab.; *Ottagam*, Tam.; *Loti-pitta* or *wonte*, Tel.; *Unta*, Malay.

In most parts of India there are different names given to the camel according to its age and sex: thus it is *bota* (male) or *botí* (female) until it can carry a burden; then it is *únt* (male) and *úntní* (female). In Jhang after

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8 years of age it is *armosh* or *út* (male) and *jharot* (female). From birth up to 8 years of age it receives the following names :—

	To 1 year.	To 2 years.	To 3 years.	To 4 years.	To 5 years.	To 6 years.	To 7 years.	To 8 years.
Male .	*Toda.*	*Masat.*	*Trihun,* *Lihak.*	*Chhatr.*	*Doak.*	*Chhiga.*	*Nesh.*	*Nesh.*
Female .	*Todi.*	*Masat.*	*Puraf.*	*Lihari.*	*Trokar.*		*Kuteli.*	

M. Kostenko tells us that in Turkistan the two-humped camel is called *tuya* and the one-humped *nar-tuya*.

References.—The following authors may be consulted:—Wellsted; Chesney; Stewart; Huc (Recollections of a Journey); Ferrier; Mignan; Pottinger (Beluchistan); Fontain (Egypt); Robinson; Postan; Kostenko; Prejevalsky; Palgrave, and the writings of many other travellers.

BREEDS AND RACES OF CAMELS.

This subject has already been alluded to while discussing the subject of the habitat of the camel. **Veterinary Surgeon Charles Steel**, in a paper read before the *United Service Institute of India*, on the camels employed in South Afghanistan during the expedition of 1878-79, states that of the "breeds of camels in India, the variety does not appear to be extensive; Rajputana supplies a great many, and from that district were derived those which were used during the siege of Delhi; our camels in South Afghanistan were almost all Sind, amongst which was a very small proportion of females, whereas, with the northern army, they are reported to have abounded; we had a small number of *Pahari* or hill camels, and a few specimens of the magnificent Persian.

"Some from Sind were very fine and powerful, distinguished by their height, length of leg, and paucity of hair, amounting in some instances to nudity, the disproportion in strength of fore and hind extremities being very remarkable, and their susceptibility to climatic changes very great; the *Pahari* is much more freely supplied with hair, is of lower stature as a rule, shorter in leg and of more proportionate development posteriorly; these certainly suffered much less from any cause, and I had no opportunity of making a *post mortem* examination.

"The Persian possesses a thick coat, splendid capillary appendages, especially about the neck, which has a deep and graceful curve; he has also a wide chest, and short legs, but I am sorry to observe that, as the climate increased in temperature, the ornamental hair began to fall off in patches, presenting a mangy appearance; this would probably be restored on the return of cold weather; there were only a few specimens, bought by officers above Kandahar as curiosities, so that there was little opportunity of judging as to their qualifications for transport."

The papers which the writer has been permitted to consult regarding the late Afghan campaign, while alluding frequently to Sind camels, would seem to shew that far from the majority of the camels employed having come from that province, as would appear to have been **Mr. Steel's** experience, they were mainly derived from the Panjáb.

With the view of indicating the comparative abundance of camels in the various districts of the Panjáb, the following official return of one

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consignment of camels furnished to the Afghan campaign may be here given:—

Sirsa	2,792
Gurgaon	97
Gujranwalla	1,867
Gujrat	186
Kohat	1,256
Ambála	652
Jhang	3,786
Múltan	6,081
Jhelum	2,224
Jullunder	502
Dera Ismail Khan	4,174
Hissar	951
Montgomery	6,919
Shahpur	6,834
Hoshiarpur	278
Hazara	480
Sialkote	1,239
Ferozepore	1,333
Muzaffargarh	1,122
Lahore	960
Banu	2,122
TOTAL	45,853

MORTALITY AMONG THE CAMELS USED IN THE AFGHAN WAR.—The verdict passed by the various officers whose opinions were called for on the subject of the losses of camels during the Afghan campaign was most pronounced and uniform. The plains camels were preferable for the transport service on the hotter or Indian side, but were quite useless for the higher and colder regions. Of the plains camels those of Bikánír were superior to the Panjáb, and these again better than the camels from Sind. **General Watson**, who commanded the Panjáb contingent, lost of plains camels 418 out of a total of 1,067, and he attributed this to the cold climate of Afghanistan, since even with every care the remainder were at the same time weak and unsuitable for service. **General Biddulph** lost between Kandahar and Chaman 263: on a march of 13 miles, under the most favourable circumstances of road and weather, he lost 100 camels, and a day or two later 56 that were marching without loads. Of the camels purchased at Dera Ismail Khan 43 per cent. perished in April and May. The majority of the camels that died at Thul during June seem to have succumbed to heat-apoplexy, while in the higher altitudes, death appears to have been caused through some affection of the lungs. The hill camels perished through the heat of the Bolan pass and the plains camels by the cold of the higher regions, but both had previously endured privation and excessive fatigue. It is reported that of the consignment of Panjáb camels above alluded to nearly 39,000 died or were lost by desertion, but it is probable that if the losses among the Sind, Beluchistan, and other camels, from the commencement to the final termination of the campaign were to be added to that number, the total losses might be close upon 60,000. These facts are alluded to mainly with the object of showing how the various breeds of camels have been acclimatised to widely different conditions. Some are suitable for the caravan traffic over hot sandy regions, which has given to this beast of burden the appellation of the "ship of the desert," while others have been so far altered in their habits and character as to be useful on rocky and mountainous countries and be even capable of sleeping on ground from which the snow has been only removed for their accommodation.

PANJAB.

breeds of camels have a great aversion to water, sickening rapidly when brought into a damp atmosphere. To the majority of camels, a slippery path, and one crossing streams, is far more trying than rough rocky ground. But as contrasting this state of affairs the camels of Kathiawar are stated to graze in the mangrove swamps. It would thus seem desirable that greater attention should be paid to the selection of camels than appears hitherto to have been done, and it might be even commended as a desirable step to organise breeding stations on the hills for the rearing of camels designed for alpine work. It was apparently with some such idea as this that the late **Lord Mayo** attempted to introduce into India the South American Llama. Unlike the camel this animal is by nature accustomed to the hills, and if successfully acclimatised might be found serviceable in the trans-Himálayan trade, if not for certain military purposes. It is, however, a much smaller animal than the camel, and perhaps even greater results might be looked for in the direction of acclimatising and improving the Central Asiatic and Afghan breeds of camels. It is very much to be regretted that, while the Indian Government has, through its endeavours to introduce new plants, almost changed the vegetable features of India, and thereby greatly extended its commerce, little or no effort has been made towards improving the stock of wild and domesticated animals in the country.

PANJÁB CAMELS.—The following extracts from the Gazetteers regarding the Indian camel may be found useful. According to the *Panjáb Gazetteer* for Jhang there are in that district two breeds of camels. These are known as the *Thalwan* and the *Bars* or *Barí*. The Thal camel is a much lighter animal than the Bar, and cannot carry so heavy a load. The female of either breed comes into heat when it is three years old, from the middle of January to the middle of April, and it may breed from that date for 20 years, and during the same period the male may be worked but the female is rarely laden. A good male camel will carry a load of 8 maunds, and he will take double marches of from 20 to 30 miles a day comfortably. In Montgomery it is stated there are three breeds known as *Soháwa*, *Ganda*, and *Hazára*—terms which seem to apply to the colour of the animal. "The *Soháwa* camel has long lips, medium-sized head, thick skin, and is of a brown colour. The *Ganda* camel is grey, and has a large head, small mouth, and thin skin. The *Hazára* camel has a small tail and is of a red colour. This is the worst of the three kinds, as it has no endurance on a journey. The *Ganda* is the best." "The camels of this district are of no use for riding." "Large herds go down annually to Bhiwáni for employment." "If well treated a camel will live for 40 years." The coupling season is from December to March, and at 4 years of age the female brings forth her first young one, gestation having lasted for 12 months. She continues bearing 9 or 10 times, at intervals of 2 years. After a year the young one is weaned, but it begins to pick grass when it is only 22 days old. A camel will feed her young and yield 12 seers of milk a day besides. The owner milks the cow twice a day, leaving two teats for the young one. The milk yields curds and butter-milk, but not butter. It acts at first as a laxative to those unaccustomed to it, but is recommended as a simple medicine for those suffering from disease of the spleen.

The Dera Ismail Khan Settlement Report states that the Pawindah camels are superior to those reared in the Dera Ismail Khan district, being similar to those in the Panjáb generally. "No good riding camels are bred in the district, the few that there are being imported from Bhawalpur and Bikánír." By the age of 16 a she-camel will have had camels are said to give as many as eight or ten foals, owing to the superior quality of grazing. "In this district," the author of the report says, "it is not the custom to make *ghi* of camel's milk, though I believe that this is done in Marwat and elsewhere."

SIND.

SIND CAMELS.—The *Sind Gazetteer*, speaking of the Jerruck district, says: of the domestic animals the one-humped camel takes the first place as a beast of burden. "Close to the sea-coast they are scarce, but in the upper part of the delta droves of forty to fifty are frequently seen. The delta-bred camel is smaller and lighter in limb than his Arabian congener, and being better fed, is a much finer-looking animal. The Karmáti tribe breed a valuable description of camel in this division—one which in pace and hardiness is said to vie with that bred in the Thar and Párkar district."

The Swiftest Indian Camels.

RAJPUTANA CAMELS.—The Bikánír camels are famous all over India for being the swiftest and best riding camels. The *Gazetteer* says: "it is a remarkable fact that the domestic animals of Bikánír are generally either finer or more serviceable than those of any other part of India. The horses, if not fine, are strong and wiry; and I have known a very ordinary-looking mare carry its rider eighty miles through sand one day and forty the next, and then without a rest continue moderate daily journeys. Well-fed riding camels will do even more than this. They do not, however, thrive well out of the sandy tract." The experience of the Afghan campaign of 1878-80 proved that the Bikánír camels were far superior to the Panjáb, and the latter superior again to the ordinary Sind animal, but of the Panjáb camels those obtained from Dera Ismail Khan were the worst, and those from Rawal Pindi the best. The camels of Rajputana, like those of Bikánír, have the reputation of being swift, and are thus good riding animals.

BOMBAY CAMELS.—Very little can be learned regarding the Bombay camels. In the Gujarat (*Gazetteer, Ahmedabad District*) it is stated that the Ahmedabad camels are less prized than those brought from Márwár. "Those, especially the very swift Thal camel, which can easily travel forty miles a day, are used for riding by Sindis. The largest number of Márwár camels is found in Dhandhuka and Wiramgám." In Kathiawar it is recorded that excellent camels are bred in Okha, Navángar, Mália, and the Machu Kántha, &c. "They abound where the mangrove grows freely, and graze in the swamps." "Camels' milk is used for feeding young horses, and in cases of diseased spleen." The idea that camel's milk strengthens and improves foals is very general all over the parts of India where the camel is met with, but the above statement that the camels of Kathiawar graze in the mangrove swamps is remarkable, as in all other districts of India the report is universal that the camel has a strong dislike to water and will not thrive in damp, swampy regions. So general is this belief that **Mr. Darwin**, in his "Animals and Plants under Domestication," was led to allude to the fact as pointing to the desert origin of the animal, since in domestication it has not been able to conquer its aversion to water. The Kathiawar breed may have overcome this feeling just as the one-humped camels reared in Afghanistan and other cold mountainous countries seem to have lost to a large extent their love for level, burning, hot, sandy plains and deserts. These mountain breeds have not only become acclimatised to colder regions, but they seem to have attained the greater muscular strength in the hind legs necessary to sustain continued marching on hilly ground. The weakness of the hind legs of the desert camel accounts for one of his most ungainly features—the great muscular development of the fore as compared with the hind legs.

Camels feeding in Swamps.

Anatomical Peculiarities of the Camel.

ARABIAN.

Arabian Camels.—**Palgrave** (*Central and Eastern Arabia, I., 324*) says: "The camel and the dromedary in Arabia are the same identical genus and creature, excepting that the dromedary is a high-bred camel, and the camel a low-bred dromedary, exactly the same distinction which exists between a race-horse and a hack; both are horses, but the one of blood, and the other not. The dromedary is the race-horse of his species—thin, elegant (or comparatively so), fine-haired, light of step, easy of pace, and much more enduring of thirst than the woolly, thick-built, heavy-footed, ungainly, and jolting camel. But both and each of them have only one hump, placed immediately behind their shoulders, where it serves as a fixing-point for the saddle or burden. Owing to this similarity, they are often confounded in the common appellations of '*Baa'reer*' or '*Nók*,' male or female camels, though yet more often the dromedary enjoys his special title of "*hejeen*" or "*dolool*." For the two-humped beast, it exists indeed, but it is neither an Arab dromedary nor camel; it belongs to the Persian breed, called by the Arabs '*Bakhti*' or Bactrian." **Palgrave** further adds that to see a dromedary it is necessary to go to Arabia, "for these animals are not often to be met with elsewhere, not even in Syria; and whoever wishes to contemplate the species in all its beauty must prolong his journey to Omán, the most distant corner of the Peninsula, and which is for dromedaries what Nejed is for horses." According to this definition the riding camels of Rajputana are the dromedaries and Bikánír the Omán of India.

Anatomical and Physiological Peculiarities.

It is beside the scope of the present paper to do more than allude to the peculiarities of the structure of the camel, which account for its powers of endurance and fitness for certain kinds of work. Reference has already been made to the exceptional peculiarity of the teeth. In the typical ruminants there are no incisor teeth in the upper jaw, their place being taken by a callous pad of hardened gum against which the lower incisors impinge. There are also no upper canine teeth; the only teeth on the upper jaw being six molars on each side. In front of the lower jaw is a continuous and uninterrupted series of eight teeth, of which the central six are incisors and the two outer most probably canines. Behind this series there is a vacant space, followed by six molars on each side. The dentition of the camel departs in a remarkable degree from this type. That animal possesses two canine-like upper incisors and two upper true canines as well. The lower canines are pointed and stand more erect than the incisors, and it possesses in addition two premolars in the upper and two in the lower jaws. The wedge-shape of the lower teeth, together with the above peculiarities, point to a special adaptation to feed upon bushy plants instead of the grasses eaten by other ungulate ruminants. The power of closing the nostrils and the presence of long eyelashes are doubtless both special provisions to protect the respiratory organs and the eye from dust. The stomach is provided with pouches on its inner wall arranged in two groups, right and left, the right being the larger. Muscular bundles are so arranged as to firmly close the openings to these pouches. It is a very generally accepted idea of these pouches that they are intended for the storage of water so as to enable the animal to endure for a considerably longer period than any other known animal an abstinence from that fluid. This idea has, however, been dwelt upon to perhaps a fanciful extent. There seems to be no doubt that they *are* used for storage of water, but the amount which they could contain relative to the size of the animal must be small indeed. This idea has led some writers, such as **Mr. Steel** already mentioned, to question the

Dentition of the Camel.

Water-pouches of the Stomach.

ANATOMICAL PECULIARITIES.

extent of abstinence from water which the camel is capable of enduring. Not only is the camel able to do without water for a certain period, but when necessity exists it is said to be able to march for some days without food. By many writers this is accounted for by the animal living upon the fat stored up in the hump or humps on its back. Before undertaking a long journey the Arab is said to feed his camel well until the hump has become solid. But by the time the march has been accomplished it has been greatly diminished. During the rutting season the male camel eats very little, and at this period it is pretty generally admitted that the hump grows smaller. Any animal, if deprived of food from sickness or famine, will of course live for a time on the fat stored in its body and grow lean. How far the hump may be a special development of adipose matter for the purpose of meeting the privations of the desert may, however, be open to question. **Mr. Kettlewell**, Veterinary Surgeon, Saharanpur, is reported to have observed that the camel's skin is deficient in perspiratory follicles and ducts. If established by other observers, this peculiarity might be viewed as again a special adaptation to the dry desert atmosphere, and might even help to account for the power of enduring, for a certain period, without water.

Fattening the hump.

Perspiratory Ducts.

One of the most striking peculiarities of the camel is the disproportion between the muscular development of the fore as compared to the hind legs. This fact seems to disqualify the animal to a large extent from being suitable for mountainous travelling. The fact also that the two legs on one side move at once weakens the animal for such work, since it deprives him of the power of placing his fore feet firmly on a steep piece of ground. The camels specially bred on the hills are said, however, to improve very greatly the muscular strength of their hind legs. It is almost needless to add that the peculiar construction of the soles of the feet is a special adaptation to sandy or shingly ground, but is ill adapted to rocky paths, and still less to muddy and slippery ground. So liable is the animal to slip and tumble, often breaking or dislocating his legs, that the natives have a habit of tying the feet together in such a manner as to prevent the legs from slipping too far apart. The callosities on the stifles, elbows, and beneath the breast serve the purpose of saving the skin from being bruised in the positions the animal is taught to assume while being loaded and unloaded, &c. Whether these are adaptations to long domestication or exist in the wild animal and are thus zoological characters of interest, seems to be a disputed point. At all events traces of them are present on the newly-born domesticated camel.

Peculiarities of the Legs and Feet.

Rutting and Breeding.

Gestation

There seems to be much difference of opinion as to the duration of the period of gestation. According to some writers the female carries her young for 11 months only, by others for 12 or even 13 months. She comes into heat when she is three years old, and bears one foal every 2 years or so for 15 to 20 years. She suckles her young for 12 months, but about 20 days after birth the infant animal commences to nibble the grass. The period of the year when rutting commences seems to have been so modified under domestication that the young are born in summer or at least during pleasantly hot weather. **Kostenko** tells us that in Turkistan the male gets *must* in the winter (from December to January), but in India this occurs from January to April. During this period the male refuses food and water and become unmanageable. The female is rarely worked, but is reserved for breeding purposes, and to supply the milk on which the camel breeders largely live. If well cared for a camel will live for 40 to 45 years.

PRIVATION.

POWER OF ENDURANCE.

Privation from both food and drink. Incidentally allusion has been made, in speaking of the anatomical peculiarities of the camel, to its power of endurance. It is only necessary to place here side by side the somewhat conflicting experiences of travellers and observers. It may be premised that an exaggerated acceptance of this notion must of necessity prove dangerous. If anything was demonstrated more clearly than another by the high mortality among the camels during the late Afghan campaign it was, that once the camel's endurance is overtaxed, it requires long rest and careful treatment to restore it to health. One of the most remarkable features of the camel is that it will go on toiling under its burden until it falls down dead. Whether over-much faith was put in the endurance of the camel or there existed a necessity to advance (even at the sacrifice of many thousands of these beasts of burden), the privation and excessive labour thrown on the camels, during the lower half of the journey into Afghanistan, so weakened the animals that even when rest and plentiful food was given them they died daily by the hundred. It was no unusual thing for the transport camels to arrive at 5 A.M., having been on the march from 8 A.M., and to be again required to march at 10 A.M. The camels and their drivers had thus neither time for sleep nor food, and even had plentiful grazing existed around the encampments the camels were too exhausted to eat it, still less to march 3 or 4 miles into the interior to find the bushes on which they were accustomed to feed. Privation of this kind naturally undermined the health of the animals, and the bones of thousands were left in the Bolan Pass, the ultimate cause of death being heat-apoplexy. Many of those that survived this ordeal succumbed to the cold of the higher regions and the approaching winter. To a certain extent such a calamity might have been averted by having a large supply of the dried plants on which the camel feeds stored as fodder at the various encampments, but it would appear no such provision was made, and many of the animals suffered from eating during the march or at the encampments (whenever even this was possible) plants either poisonous to the camel, or upon which it was not accustomed to feed. Much difference of opinion exists as to whether the camel is stupid enough to eat poisonous plants: if he is not normally so, privation seems to have that effect on him. The camels from the plains at all events were observed to eat plants which the hill camels would not touch, and which have the local reputation of being poisonous to the camel. In another paragraph will be found a list of the camel fodders and of the few plants which the camel will either not eat, or, if he does so, is poisoned thereby.

Speaking of the power of doing without water, **Skinner** (*ii., pp. 112—113*) tells us that his camels had been 19 complete days without drinking. On the other hand, numerous writers affirm that three or at most five days without water will kill the camel unless the fodder given is green and moist. **Kostenko** tells us that camels eat only during the day: they eat quickly and are satisfied with 2-3 hours grazing. If subjected to privation the load must be gradually reduced, and when forage is obtainable the nature and amount should be carefully regulated for the first few days. If the camel is capable of enduring a very considerable amount of privation, it can also eat to excess during times of plenty. **Pottinger**, in preparing for an expedition, gave his camels 15℔ of flour a day in addition to all the grass they could eat. So greedy is the camel of food, after a few days' desert marching, that **Sir Samuel Baker** says, when it arrives in good pasture, it often dies in a few hours from inflammation caused by repletion. Reference has already been made to the popular notion that the hump is a store of fat used by the animal when other food is not obtainable. It is a commonly reported opinion that no amount of grain will serve to sustain the camel if it is not provided with its usual amount of grazing. Its large stomach requires a bulky material to excite digestion.

LOAD, DISTANCE, AND RATE OF MARCHING.

Average load 400lbs.

The carrying power of the camel will depend to a great measure on the stock it has come from, and the climate in which it is to be employed. The Central Asiatic camel is, as a rule, more vigorous and enduring than either the Indian or African. The load a camel will bear greatly depends on the nature of the work on which it is employed. For a short distance, and in its usual avocation, a healthy camel will carry about 1,100 to 1,200℔, but where produce or baggage has to be carried to a distance, 300 to 400℔ will be found a heavy enough load. **Captain Lord** estimates seven camels to the ton, where marches of 20 miles a day (of 8 to 10 hours) have to be performed. Where more rapid movements are desired the burden should be proportionately lightened. In Algeria, Morocco, Tunis, Tripoli, 300 to 400℔ is the load. In Egypt 350 to 550℔. In Syria, Asia Minor, Turkey in Asia, Persia, and Tartary 550 to 600℔; but large-sized bull-camels are usually employed. In Beluchistan, Kabul, Hindustan, Tibet, Burma, and Mongolia 300 to 400℔. In Crim-Tartary and the borders of Southern Asia 300 to 500℔; but in the latter case the Bactrian or two-humped camel is employed.

Prime age 4-12 years.

Colonel J. I. Boswell says the Panjáb camels known as *Sangar* are capable of great endurance. They are in their prime from 4 to 12 years old, and should not be purchased beyond that age, although a good camel may be worked until it is 18 or 19 years of age. In agricultural districts they are often, however, worked until they are 20 or 25 years old, but may live to 40 or 45 years. They should not be worked during the hot weather, from May to October, and by the end of July it is customary to give them a good purgative, followed after the action of the drug by a dose of alum. It is also a common practice to anoint the body with oil at this period so as to prevent mange. **Kostenko** says that the Turkistan camel walks at the rate of 2¾ miles an hour with a full load, but if lightened he will go 3 to 3½ miles. The trotting camel gets over 6¾ miles an hour. If these figures be correct it may be added that a good Bikánír camel trots much faster than the Turkistan animal. The trotting motion is said to be very easy, but the gallop extremely disagreeable. Swift camels are reported to get over 100 miles a day at a push, but the ordinary journey which they will keep up day after day is about 40 to 50 miles. **Fortune** mentions an instance of an Arab having accomplished a journey of 225 miles in 28 days, thus keeping up 8 miles an hour continuously. **General Chesney** mentions that he crossed from Basrah to Damascus, a distance of 958½ miles, in 19 days, a daily rate of 50 miles. It is worth adding in this connection that in 1791 **Mr. James Rennell** proposed, in the Transactions of the Royal Society, that, owing to the uniformity of pace kept up by the camel, that animal might be employed to measure distances during geographical exploration. He cited that the distance between Aleppo and Bussora had been accomplished by **Carmichael** in 322 hours, by **Cupper** in 310 hours, by **Hunter** in 299½ hours, the variations being accounted for by the slightly different tracts followed.

Rate of marching 2[illegible] to 4 miles.

Camels in harness.

The Kirghiz often harness the camel to their carts, the shafts being fastened by a cord passing behind the foremost hump. When so yoked they will draw 730℔, but if harnessed to a properly-constructed cart they will draw 1,800 to 2,160℔. In Rajputana the camel is sometimes seen

PECULIARITIES OF THE CAMEL.

It has already been stated that the camel will continue to carry its load until unable to go further. When this point has been reached it will drop down and nothing will induce it to rise again. In military movements, under such circumstances, the animal has to be abandoned, and in the majority of cases it dies on the spot where it fell. In other instances, after a time it revives and is doubtless taken possession of by the people of the country.

Camels are trained.

At two years of age it is taught to sit down and rise up at the command of its owner; while sitting it is loaded, and if too heavy a load has been assigned to it, it refuses to rise. The "docility of the camel" is almost proverbial. **Veterinary Surgeon Ch. Steel** says of it: "So patient and docile is he in our service; so tolerant of abstinence on an emergency; so well adapted by his arched spine (the hump is not here alluded to) and flat sides for the imposition of loads; and by his elastic cushion-like feet to traverse loose sandy ground, that little observation is required to recognise him as a beast of burden, especially designed for certain localities." This is the popular conception of the camel and the conception all but universal a few years ago. But opposed to it, **Sir Samuel Baker**, in *The Albert Nyanza*, speaks of the dulness and stupidity of the camel as illustrated by his eating indiscriminately every green vegetable, whether wholesome or poisonous. **Palgrave** (*Central and Eastern Arabia, I., 39*), referring to the popular notion of the docility of the camel, says: "If 'docile,' means stupid, well and good; in such a case the camel is the very model of docility. But if the epithet is intended to designate an animal that takes an interest in its rider so far as a beast can, that in some way understands his intentions, or shares them in a subordinate fashion, that obeys from a sort of submissive or half fellow-feeling with his master, like the horse and the elephant, then I say the camel is by no means docile, very much the contrary; he takes no heed of his rider, pays no attention whether he be on his back or not; walks straight on when once set a-going, merely because he is too stupid to turn aside; and then, should some tempting thorn or green branch allure him out of the path, continues to walk on in this new direction simply because he is too dull to turn back into the right road." "He will never attempt to throw you off his back, such a trick being far beyond his limited comprehension; but if you fall off, he will never dream of stopping for you, and walks on just the same, grazing while he goes, without knowing or caring an atom what has become of you. If turned loose, it is a thousand to one that he will never find his way back to his accustomed home or pasture, and the first comer who picks him up will have no particular shyness to get over." "One only symptom will he give that he is aware of his rider, and that is when the latter is about to mount him . . . he will bend back his long snaky neck towards his master, open his enormous jaws to bite if he dared, and roar out a tremendous sort of groan, as if to complain of some entirely new and unparalleled injustice about to be done to him. In a word, he is from first to last an undomesticated and savage animal, rendered serviceable by stupidity alone, without much skill on his master's part or any co-operation on his own, save that of extreme passiveness."

Docility.

DISEASES.

DISEASES.

The limited space at the writer's disposal has compelled the present article to assume the form of little more than an abstract of the literature on the subject. He is thus precluded from attempting to give even the commonest facts regarding the diseases of the camel or their modes of treatment. It is generally believed that the camel is liable to a number of diseases

DISEASES.

peculiar to itself, but is not subject to the attacks of infectious diseases which carry off other cattle. For military purposes by far the most serious disorder is the result of careless loading and a badly fitting saddle, namely, bruises on the back. With care these need not occur, and after seeing that the saddle fits well the next best preventive is to ascertain if the load be well balanced, for nothing is more annoying to the camel or a more fruitful source of sores than a load heavier on one side than the other. It has already been stated that many of the camels employed in the Afghan campaign succumbed to heat and others to cold, but it has been contended that the privation they endured for some time previously was the actual cause of death. This seems to be proved by the immunity enjoyed by the camels belonging to the officers, most of which returned in safety to India after passing through both the heat and the cold to which they were exposed while accomplishing for months heavy and forced marches. For an account of the diseases of the camel and their treatment, the reader is referred to a valuable memorandum written by **Dr. W. Gilchrist**, of the Madras Army, in 1842, and which to this day is perhaps the best treatise that has appeared.

Dr. Gilchrist classifies the diseases to which the camel is subject as follows:—

I.—Diseases of the Head—

- (*a*) *Kuppalí-ka-murz.*
- (*b*) *Bhao-ka-murz* or *dhudka.*
- (*c*) *Múrghí-ka-murz* (Epilepsy).
- (*d*) *Cummaun-ka-murz.*
- (*e*) *Jolah or Luckwah*—Paralysis of the hinder extremities.

II.—Diseases of the Contents of the Chest—

- (*a*) *Pæpra or Pæpsa.*
- (*b*) *Kúd-ka-murz.*
- (*c*) *Solfa-ka-murz* or *Zillay Báz.*
- (*d*) *Chúdi-ka-murz.*
- (*e*) *Kuddah-ka-murz.*

III.—Affections of the Stomach—

- (*a*) *Oakahl-ka-murz*—Vomiting.
- (*b*) *Soale or Malole*—Colic.
- (*c*) *Zárbahd*—Dropsical affection.

III.—Affections of the Stomach—*contd.*

- (*d*) *Zooláb*—Purging.
- (*e*) Indigestion.

IV.—Affections of the Urinary Organs—

- (*a*) *Súzák* or Bloody Urine.
- (*b*) *Phudmúte*—Difficulty in passing urine.
- (*c*) *Dhundí-ka-murz.*

V.—Special Diseases—

- (*a*) *Udharung-ka-murz*—Rheumatism.
- (*b*) *Jennuk vaye* or Paralysis.
- (*c*) Tumours.
- (*d*) *Surdhí*—cold.
- (*e*) *Kárísh*—Itch.
- (*f*) Sores, especially of the breast-plate or *Rahafay.*
- (*g*) Ulcerated feet.
- (*h*) Sore back.
- (*i*) Fractures.

In the Montgomery Settlement Report the following diseases are enumerated: *Sat, Zahmat, Hibbi, Phet, Sokra, Khárish, Símok, Barr, Gathar, Bel, Akra, Chandri* or *Chháliyán*, and *Rasaula.* Young camels are subject to two diseases—*Sul* or colic, and *Rik*, excessive purging. Of the foregoing *Khárish* is said to be contagious, and *Sat* and *Zahmat* infectious.

Kostenko says the disease known in Turkistan as *Sarpo* causes the soles of the animal's feet to fall off, and he adds, that as with all the other diseases to which the camel is subject, this is treated by the nomads by freedom from work and good food.

FOOD AND FODDER.

Food and Fodder.

To keep a camel in health it should be allowed 6 hours' grazing and 2 seers of gram a day, or if grazing be scanty 3 seers of gram. **Kostenko** says the camel eats all the herbs and grasses unfit for other animals, and is indifferent as to the quality of the water it drinks—brackish, stagnant, or putrid. It can pass 2, 3, or 4 days without drinking and 3 days without food. While subjected to such privation, the load should be lightened and not re-imposed for at least a week after. The Bactrian camel has been referred only to by way of comparison, in the foregoing account, and it may here be disposed of by saying that in winter, when the country is covered with snow, it grazes chiefly on the willow. Of the plants which the Indian camel will graze on a few are more important than the others, because no other animal can subsist on them, and they are accordingly treated as more peculiarly camel fodders. It would be much easier, however, to enumerate the plants which the camel will not eat, or which are poisonous to it, than to mention those on which it may be fed. The latter would almost mean a list of the plants of India. The practical object will therefore be met by furnishing two lists, *viz*., the plants mentioned by authors as more peculiarly camel fodders and the plants of which the camel will either not eat or on which at least it cannot subsist or which are poisonous to it.

CAMEL FODDERS.

1. **Acacia arabica**, *Willd.;* Leguminosæ.

Indian Gum Arabic.

Vern.—*Bábúl, babla, kikar,* Hind., Beng., and Dec.; *Vabbúla, barbara,* Sans.; *Ammughilán,* Arab.; *Kári-mughilán,* Pers.; *Babbar,* Sind.; *Karúvelum,* Tam.; *Nella túma,* Tel.; *Bábhúla, káli-kikar, ráma-káti,* Bom.; *Gobli,* Kan.

A small tree, wild in Sind, Rajputana, Guzerat, and the Northern Deccan; commonly cultivated throughout the plains of India.

The green pods with tender shoots and leaves are given as fodder for cattle, sheep, goats, and camels; and are specially valuable for this purpose during a season of drought when other fodder fails.

2. **Acacia Farnesiana**, *Willd.;* Leguminosæ.

Vern.—*Viláyati kikar, Gú-kikar,* Pb., Hind.; *Baver,* Sind.

A thorny shrub met with all over India. According to **Stocks,** used as a camel-fodder in Sind.

3. **Ægiceras majus**, *Gærtn.;* Myrsineæ.

Vern.—*Halsí, khalshí,* Beng., Hind.; *Chawír, kánjlá,* Sind.

A shrub or small tree of the sea coast from Sind to Singapore, especially in the mangrove swamps.

Stocks says that in Sind the camels browse on this plant.

4. **Albizzia Lebbek**, *Benth.;* Leguminosæ.

Vern.—*Siris, siras, sirín, sirai, tantia, garso,* Hind.; *Sirasa, surí, shirrus,* Sind.; *Siris, sirisha,* Beng.; *Vaghe,* Tam.; *Dirasan, darshana,* Tel.; *Kal baghi, bengha,* Kan.; *Kokko,* Burm.; *Beymadá, gachodá,* And.

A large tree found wild or cultivated in most parts of India.
The leaves are used as camel fodder.

5. **Alhagi maurorum.** *Desv.*; LEGUMINOSÆ.

THE CAMEL THORN OR SHÚTAR KHÁR.

Vern.—*Juwásá* or *junvásá* or *yavásá, javánsá,* HIND., PB., BOM.; *Tamiya, jawá, jawása, jawán,* PB.; *Dulallabhá,* BENG.; *Kandero,* SIND.; *Duralabha, girikarnika, yavása,* SANS.; *Shutar khár,* PERS.; *Alhaju,* ARAB.; *Zaz,* PUSHTU; *Zoz, zozán,* TRANS-INDUS.

A widely distributed shrub of the Ganges valley and the arid and northern zones; a native of south Africa, the deserts of Egypt, Arabia, Asia Minor, Beluchistan, and Central India. Abounds in many of the arid parts of the Panjáb plains; also common near Delhi.

In the hot season, when almost all the smaller plants are withered up, this puts forth its leaves and flowers. These are greedily eaten by the camel, and so much does that animal depend upon this plant that it has received the name of the camel-thorn. An officer, writing after the close of the Afghan campaign, says that the camels grazed upon this plant in the Pishin. The bush, he adds, is common all over the country. The Natives collect it in October or November and beat it up into *bhusha.* It is probable that about 50 to 60 maunds might be collected at Pishín and stored for winter use.

6. **Amarantus polygamus,** *Linn.*; & **A. tenuifolius,** *Willd.*; AMARANTACEÆ.

Vern.—*Chamliság, Chauldi,* HIND.

These plants are common throughout India, the former very much so at Múltán. They are probably both alluded to by **Stocks** as the Sind camel fodder *mullíro.*

7. **Anthrocnemum indicum,** *Moq.*; CHENOPODIACEÆ.

Vern.—*Machúr, kiar, konti láni,* SIND.

A common plant in Bengal, Northern Circars, Bombay, and Sind.

Used in Sind for making an inferior *khár sajji* and regarded as a good fodder. The young stems are pickled and eaten by the people of Bombay.

8. **Atriplex Stocksii,** *Boiss.*; CHENOPODIACEÆ.

Common in the salt marshes near Karachi; doubtless grazed by camels, and is probably the Sind plant (*jurí*) alluded to by **Stocks.**

9. **Avicennia officinalis,** *Linn.*; VERBENACEÆ.

THE WHITE MANGROVE.

Vern.—*Biná* (*Bani* by *Gamble*), BENG.; *Mada, nalla-mada,* TEL.; *Tivara, timmer,* SIND.; *Oepata,* MAL.; *Thamé,* BURM.

A small tree or shrub of the salt marshes and the tidal forests of India and Burma, found also in the Andaman Islands.

The *Bombay Gazetteer* states that camels graze in the mangrove swamps, but it is probable that they feed in such localities to a large extent on **Suæda nudiflora** and **S. maritima,** although **Stocks** enumerates **Avicennia tomentosa** (the *timmer*) as one of the Sind camel fodders.

10. **Bauhinia racemosa,** *Lam.*; LEGUMINOSÆ.

Vern.—*Kachnál, gúriál,'ashta, makkúna, thaur, dhorára,* HIND.; *Banraj,* BENG.; *Kosúndra, taur,* PB.; *Dhondri, bosha,* GOND.; *Jhinja,* AJMERE; *Ambhola,* URIYA; *Ari, arro,* TEL.; *Ati, areka,* TAM.; *Palan,* BURM.

A small tree met with in the sub-Himálayan tract, from the Ravi eastward, Oudh, Bengal, Burma, Central and South India.

In parts of N. India the leaves are eaten by buffaloes and camels.

11. **Berberis,** various species; BERBERIDEÆ.

Mr. J. H. Lace says the leaves are eaten by camels in South Afghanistan, especially those of the form known in Pushtú as *Saraey-Zaralgh.*

12. **Calligonum polygonoides,** *Linn.;* POLYGONACEÆ.

Vern.—*Balanja, phok, phogalli* (flowers), PB.; *Berwaja, tatúke,* TR.-IND.

A shrub of the southern and south-western Panjáb and Sind. It has a pleasing appearance with its leafless branches and small pink flowers, which in May are succeeded by small fruit.

The shoots are relished by goats and camels.

13. **Carduus nutans,** *Linn.;* COMPOSITÆ.

THE THISTLE.

Vern.—*Kanchári tiso,* PB.

Found in the Western Himálaya, from Kashmír and Hazara to Simla, altitude 6,000 to 13,000 feet, but in the cold season it appears in the plains of India as a weed of cultivation.

Eaten by camels greedily and when bruised, to destroy the prickles, is given to cattle.

14. **Corchorus Antichorus,** *Rœusch.;* TILIACEÆ.

Vern.—*Baphuli,* HIND.; *Múdheri,* SIND.

A much-branched bush, found in North-West India and Sind, and distributed to Afghánistan.

Stocks mentions this as a camel fodder in Sind.

15. **Cressa cretica,** *Linn.;* CONVOLVULACEÆ.

Vern.—*Gún,* SIND.

A very small shrub met with throughout India and all warm countries.

Stocks says that in Sind this is employed as a camel fodder.

16. **Crotalaria Burhia,** *Ham.;* LEGUMINOSÆ.

Vern.—*Sís, síssai, pola, búta, bhata, búi, &c.,* PB.; *Drunú,* SIND.; *Burra, bhota,* THUL.

A bush frequent in the more arid parts of the Panjáb and Sind. Browsed by cattle and camels. Is mentioned in the official correspondence regarding the camels used in the Afghan campaign as being excellent fodder and a common plant at Thul.

17. **Dalbergia Sissoo,** *Roxb.;* LEGUMINOSÆ.

THE SISSOO.

Vern.—*Shísham, sissú, sissai,*[1] HIND.; *Táli, safedar, shísham, shísháí, shin nelkar,* PB.; *Shewu,* PUSHTU; *Sissái,* OUDH; *Sasam, sasem,* ARAB.; *Yette, nukku-kattái,* TAM.; *Sissú, karra,* TEL.

A large, deciduous tree of the sub-Himálayan tracts, from the Indus to Assam, ascending to 3,000 feet. Now largely cultivated throughout the plains of India as an ornamental tree along roads, &c.

Young trees browsed by cattle, goats, and camels.

18. **Dodonæa viscosa,** *Linn.;* SAPINDACEÆ.

Vern.—*Aliár,* PB. (plains); *Sanattha, sánthá, mendrú,* &c. (on the hills).

An evergreen shrub found throughout India and in all warm countries.

Said to have been eaten by the camels at Thul during the Afghan campaign not to agree with them.

19. **Eclipta alba,** *Hassk.;* COMPOSITÆ.

Vern.—*Kesuti,* BENG; *Máka,* BOMB.; *Tik,* SIND.; *Búkan, bhangra,* PB.; *Kadím-el-bint,* ARAB.

A weed of damp places throughout India and ascending the hills to 5,000 feet.

Stocks includes this among his Sind camel fodders.

20. **Haloxylon multiflorum,** *Bunge.;* CHENOPODIACEÆ.

Syn.—ANABASIS MULTIFLORA, *Moq.*

Vern.—*Gora láni, láná* or *lánó,* SIND.; *Ghalme,* TRANS-INDUS.

Common in the North-Western Panjáb and the Salt Range, and distributed to Afghánistan. Camels are fond of the plant.

21. **H. recurvum,** *Bunge.;* CHENOPODIACEÆ.

By mistake this plant was alluded to by **Stewart,** and following him by all subsequent authors, including the writer (see B. 162) as **Caroxylon Griffithii,** *Moq.*, an Afghán plant not found in India. **Haloxylon recurvum** is the plant from which *khár-sajjí* is chiefly made in India, and it is the salt plant most relished by the camel.

It is known in the Trans-Indus as *laghme,* and in Cis-Indus as *khár,* in Sind as *kári láni.* A writer in the *Panjáb Gazetteer* says that camels thrive best if fed one day upon the *láná* and the next upon the *pílú* (**Salvadora oleoides**). The term *láná* appears to be almost generic for all the Chenopodiaceous plants alluded to in this list, but it is more especially applicable to this species.

22. **Halocharis violaceæ,** *Bunge.;* CHENOPODIACEÆ.

Western Panjáb, the Salt Range, and Peshawar.

No mention is made of this plant by writers on the subject of camel fodders, but it is doubtless used for this purpose, although not recognised as distinct from the other imperfectly known salt-plants.

23. **Indigofera pauciflora,** *Delile;* LEGUMINOSÆ.

A bush met with in the plains of Sind and the Panjáb to Beluchistan. **Stocks** mentions this as a Sind camel fodder under the name *Jhil.*

24. **Kochia indica,** *Wight.;* CHENOPODIACEÆ.

Common on salt soils from Delhi to the Indus.

The remark under **Halocharis violaceæ** applicable to this plant also.

25. **Lippia nodiflora,** *Rich.;* VERBENACEÆ.

Vern.—*Wukkun,* SIND; *Búkan, jalnim, gorkhmúndí,* PB.

A creeping herbaceous plant, found in wet places throughout India. **Stocks** mentions it as a camel fodder in Sind.

26. **Leptadenia Spartium,** *Wight.;* ASCLEPIADACEÆ.

Stocks mentions this as a camel fodder in Sind, known as *kip*; by some writers *kip* is given as the vernacular name for **L. viminea,** *Bth. & Hook.*

27. **Lycium europæum,** *Linn.;* SOLANACEÆ.

Vern.—*Ganger, kangú, kúngú mrál, chirchitta,* PB.

A thorny shrub of the drier plains of the Panjáb, Sind, and Guzerat.

The plant is browsed by camels and goats, and the young shoots are used as a vegetable.

28. **Melia Azadirachta,** *Linn.;* MELIACEÆ.

THE NEEM TREE or MARGOSA TREE.

Vern.—*Nim, nimb,* HIND., BENG.; *Nimori,* SIND; *Nimba,* SANS.; *Azáddiracht,* PERS.; *Betain,* KUMAON; *Kohumba,* GUJ.; *Veypam, veypale,* TAM.; *Yapa, vepa,* TEL.; *Ariabepon,* MAL.; *Thimbaubhempu,* or *thimbau-ta-ma-kha,* BURM.

A middle-sized (sometimes large) tree with small, luxuriant foliage common everywhere in India from the Jhelum to Assam and Ceylon.

The leaves are cooked in curry, or are simply parched and eaten. The natives are very fond of them on account of the slightly bitter taste of the curry cooked with those leaves. They are also used for camel fodder.

29. **Mimosa rubicaulis,** *Linn.;* LEGUMINOSÆ.

Vern.—*Rál, khair, didriár, kikkri,* PB.; *Hajeru,* SIND.

A large, straggling, prickly shrub, found throughout the greater part of India, ascending to 4,000 feet in altitude.

Stocks mentions this as a camel fodder in Sind.

30. **Mollugo hirta,** *Thunb.;* FICOIDEÆ.

Syn.—GLINUS LOTOIDES, *Linn.*

Vern.—*Gandi búti, porprang,* PB.; *Kotuk* or *kothuk,* SIND.

A weed of all warm regions, common throughout India.

This is one of the Sind camel fodders according to **Stocks.**

31. **Phœnix dactylifera,** *Linn.;* PALMÆ.

DATE PALM.

Vern.—*Khajúr, khaji,* HIND.; In the Panjáb the fruit is *pind, chirwi, bagri;* the cabbage of leaves *gadda, galli.*

A palm, which attains a height of 50 feet or more; it is cultivated and self-sown in South Panjáb and adjoining parts of Sind. It does not thrive well in Lower Bengal.

The hard kernels of the fruit are ground and serve as food for camels, goats, sheep, horses, and other animals. The leaves cut up are sometimes given as fodder.

32. **Pistacia integerrima,** *J. L. Stewart;* ANACARDIACEÆ.

Vern.—*Kakrasinghi,* BENG.; *Kaka, kakkar, kangar, túnga,* PB.; *Spui, saráwan, masua,* AFG.

A tree with rough bark, met with on the Sulaiman Range and the outer North-West Himálaya, extending eastward to Kumáon, altitude 6,000 ft.

The leaves are lopped for fodder for buffaloes and camels.

33. **P. mutica,** *Fisch. & They.*

Agoakái, TRANS-INDUS.

This appears to be the plant called **P. Terebinthus** by **Stewart** and collected by **Bellew** in Eastern Afghánistan and **P. Kinjuk** by **Stocks** followed by **Boissier. Aitchison** describes two forms of it as met with in the Kuram valley, and several officers of the late Afghan campaign allude to **Khinjak,** a tree with purple berries, found in Pishín, especially in the valley leading to Toba, upon the leaves of which the camels were fed.

34. **Prosopis spicigera,** *Linn.;* LEGUMINOSÆ.

Vern.—*Jhand, jandi seh, khár, kharnúb* (the galls); *Sangar, sankhri, shangar* (the pods), PB.; *Kandi, kundo, samada, sami,* SIND; *Khijra,* RAJPUTANA; *Semru, hamra,* GUZ.; *Shami,* BENG.; *Perumbe, jambu,* TAM.

A moderate-sized tree in the north and south dry zones of India; the Panjáb, Sind, Rajputana, Guzerat, Bundelkhand, and Dekkan.

The pods are sometimes given as fodder to camels, cattle, and goats; but as they are eaten by the people they are as a rule too valuable for this purpose. They contain a sweetish substance, and in consequence camels are sometimes given a feed more by way of medicine, for sugar or *gúr* is one of the medicines most frequently resorted to by camel-owners when their animals are ill or have been over-worked. Mentioned by **Stocks** as a camel fodder.

35. **Psoralea plicata,** *Delile;* LEGUMINOSÆ.

Vern.—*Bakhtmal,* PB.

A low, much-branched shrub in the arid plains of the Panjáb. Camels are fond of it.

36. **Quercus Ilex,** *Linn.;* CUPULIFERÆ.

THE HOLLY OAK.

Vern.—*Charrei, serei, balút, sháh balút,* AFG.; *Chúr, bán, kathún bán, írri, yirú khareo,* PB.; *Spercherei, pargái, kharanja,* TRANS-INDUS.

Dr. Aitchison says that in Kuram the variety of this plant, devoid of spines, is given as a camel fodder. **Major Clifford** mentions that a bush like the holly found in Pishín was eaten by the camels, but only in June and July, after which it became too spiny. By another writer it is stated that a so-called **Ilex** eaten by the camels did not agree with them. It is probable that both the last writers allude to the holly-oak.

37. **Rubia tinctorum,** *Linn.;* RUBIACEÆ.

THE EUROPEAN MADDER.

Vern.—*Manyunth,* SIND; *Manjít,* AFG.; *Rodang, runás,* PERS.

Cultivated in Kashmír, Sind, and distributed wild or cultivated to Afghánistan and westward to Spain.

The leaves and herbage are said to be used in some parts of Sind as fodder for camels and other animals.

38. **Salicornia brachiata,** *Roxb.;* CHENOPODIACEÆ.

Occurs on the coasts of Bengal and Madras, and may be used as a camel fodder in Southern India.

39. **Salsola fœtida,** *Del.;* CHENOPODIACEÆ.

Vern.—*Motí láni,* PB.; *Mitho láni, samundar láni,* SIND.

A camel fodder, but also used in the preparation of *khár sajji,* especially near Jhelum.

40. **S. Kali,** *Linn.*

Occurs in the northern Trans-Indus, and is perhaps the plant employed at Peshawar in the preparation of *khár-sajjí.* It no doubt is also eaten by camels.

41. **Salvadora oleoides,** *Dcne.;* SALVADORACÆ.

Vern.—*Kabbar, jhar, diár, jál, váni jhál, ughai, koku, pílú, píl, plewane, míthi ván,* HIND., PB., TAM.; *Pílú,* MAR.; *Sadni djar, mithi-diár,* SIND.

A large, evergreen shrub of the Panjáb and Sind, often forming the greater part of the vegetation of the desert, and ascending the Trans-Indus hills and Salt Range to 3,000 and 4,000 feet in altitude. Flowers in April, and its fruit ripens at the beginning of the hot weather. The fruit is sweetish and is largely eaten by the natives.

The leaves serve as fodder for camels.

42. **Salvadora persica,** *Linn.*

Vern.—*Jit, kaurí ván, kaurí-jál, chhoti ván,* PB.; *Jál,* N.-W. P.; *Kabar* (*kuber* by **Stocks**), *khori djhar, khari djar,* SIND; *Pedda-warago-wenki,* TEL.; *Opa, ughai,* TAM.

A small, thick-stemmed, soft-wooded tree, wild in many of the drier parts of India, *e.g.*, Panjáb, Sind, Rajputana, North-West Provinces, Guzerat, Konkan, and the Circars. Produces flowers and very small black red juicy currant-like berries, having a strong aromatic smell, and pungent taste somewhat like mustard or garden cresses.

The shoots and leaves are pungent, and are occasionally eaten as salad; given as fodder to camels.

43. **Suæda fruticosa,** *Forsk.;* CHENOPODIACEÆ.

Vern.—*Chhoti láni, lúnak, phesak láné, baggi lána, dána,* CIS-INDUS; *Zamái,* TRANS-INDUS; *Aout láni, usak láni, lúnak,* SIND.

A sub-erect bush, common in North-West India from Delhi to the Indus, and distributed westward to Africa and America.

Employed in the preparation of *khár sajji,* but also extolled as a camel fodder. **Major Clifford** says, it is abundant at Chuckluk in Pishín.

44. **S. maritima,** *Damort.*, and **S. nudiflora,** *Moq.*

Occur on the coast in the Mangrove swamps, and are most probably the plants on which the Kathiawar camels graze, much more so, in all probability, than on the Mangrove itself. Both are used in the preparation of *khár sajji.*

45. **Tamarix gallica,** *Linn.;* TAMARISCINEÆ.

Vern.—*Jhaú, lái,* HIND., SIND.; *Koán, rúkh, pilchi, farash,* PB.; *Ghalei,* PUSHTU.

This is repeatedly alluded to by the officers of the Afghan campaign as one of the plants their camels seemed to enjoy. No writer alludes to the camels as feeding on this plant in the plains of India.

Trianthema.—Four species belonging to this genus frequent the sandy tracts of the Panjáb and Sind, and, according to **Stocks**, one or all are known as *Fysur láni;* they are regularly eaten by camels.

The following are the better known species of this genus:—

46. **Trianthema cyrstallina,** *Vahl.;* FICOIDEÆ.

Vern.—*Alethi,* PB.; *Kuka-pal-kura,* TEL.

A prostrate, branched herb, met with throughout India, from the Panjáb to Ceylon, excepting Bengal.

In the Panjáb it is very common, and near Múltán its seeds are swept up in times of famine and used as food. (*Dr. Stewart.*)

47. **T. monogyna,** *Linn.*

Syn.—T. OBCORDATA, *Roxb.;* T. PENTANDRA, B. OBCORDATA, *DC.*

Vern.—*Swet-sabuni, lál-sabuni,* HIND.; *Yurra-galjeror, bodo-pel-kura,* TEL.; *Wah, waho,* SIND.; *Marmay,* PB.

Common throughout India and Ceylon.

The leaves and tender tops are eaten by the natives in curries.

48. **T. pentandra,** *Linn.*

Syn.—T. OBCORDATA, *Wall.*

Vern.—*Bishkhapra, itsit, narma,* PB.

Common as a weed in waste grounds on the plains of the Panjáb, Sind, and the North-West Provinces.

The tender tops, together with the leaves, are eaten as a pot-herb.

49. **Vitis carnosa,** *Lam.;* AMPELIDEÆ.

Vern.—*Kárik, gídardák,* PB.

A climber found in valleys at the foot of the Himálaya, especially the Panjáb and in Kashmír.

Eaten by camels.

50. **Zizyphus nummularia,** *W. & A.;* RHAMNEÆ.

Vern.—*Mallá, bér, birár, jhari,* N.-W. P.; *Gangr, jangra,* SIND; *Mallá, kokní bér, mara bér, jand, jharberí sarí, birotá,* PB.; *Karkana,* TRANS-INDUS; *Karkanna,* AFG.

A densely-branched, small bush, met with in the drier parts of India.

Mr. F. Kinsman, of the Telegraph Department, informs the writer that this plant may be regarded as the most important camel fodder in a great part of Rajputana. The natives, to cut the plant, have invented a peculiar axe, with the cutting edge turned, so that it is parallel to the ground. The bushes are periodically lopped to the ground by means of this axe. The thorny twigs are then beaten to separate the leaves. These are given to the camels and the dried twigs used as firewood. The bush grows wild over the uncultivated sterile tracts of Rajputana, but it is left in the fields here and there or encouraged to grow as a hedge plant in order thus to afford both camel fodder and fuel.

51. **Zygophillum simplex,** *Linn.;* ZYGOPHYLLEÆ.

Vern.—*Alethí,* PB.

A prostrate, much-branched herb of the arid, sandy tracts in Sind and the Panjáb.

The smell is so detestable that few animals will eat the foliage.

Stocks, however, says this is a camel fodder known in Sind as *pat lání* or *gadha lání.*

PLANTS POISONOUS OR AT LEAST NOT WHOLESOME TO CAMELS.

1. **Acorus Calamus,** *Linn.;* AROIDEÆ.

Vern.—*Bach,* HIND.; *Vekhanda,* BOMB.; *Vaj,* ARAB.; *Agri-turki,* PERS.; *Bari boj,* PB.

A semi-aquatic plant, met with in damp places in India, at altitudes from 3,000 to 6,000 feet.

It is reported that at Quetta and Pishín an Iris-like plant, eaten, during the Afghan campaign, by the camels from the plains, proved poisonous to them. The hill camels did not eat the plant. This seems to be the same plant which **Mr. Steel** speaks of under the name *akrí,* a word which may be taken as derived from the Persian name for this plant. **Mr. Steel** appears to think, however, that the camels in Quetta were not quite so stupid as to eat the *akrí,* but several officers report that they were poisoned by an Iris-like plant, which as here suggested may probably be **Acorus Calamus.** It is necessary to add that the name *akrí* is in the Panjáb applied to **Withania coagulans** (which see), a plant which bears no resemblance to an Iris whatsoever.

2. **Calotropis gigantea** and **C. procera,** *R. Br.;* ASCLEPIADACEÆ.

Vern.—*Ak, madár,* HIND., PB., and SIND.; *Spalmei, spalmak,* AFG.; *Ushar,* ARAB.; *Khark,* PERS.

Stocks enumerates this among his four

3. **Cannabis sativa,** *Linn.;* URTICACEÆ.

HEMP.

Vern.—*Gánjé-ká-pér,* HIND.; *Gánja, bháng,* BENG.

4. **Euphorbia neriifolia,** *Linn.;* EUPHORBIACEÆ.

Vern.—*Mansa sij,* BENG.; *Gángichú,* PB.; *Thohur,* SIND; *Thor,* BOMB.

5. **E. Royleana,** *Boiss.*

Vern.—*Thor,* NORTHERN INDIA; *Súlí, chúla, chúnga,* PB.

A very common bush in the Lower Panjáb Himálaya, growing in dry, exposed, sterile situations.

6. **E. Tirucalli,** *Linn.*

Vern.—*Lanká sij,* BENG.; *Sehud sij,* HIND.; *Síhar* (or *sair*), *séwar,* SIND.

7. **Nerium odorum,** *Solander;* APOCYNACEÆ.

SWEET-SCENTED OLEANDER.

Vern.—*Kaner, kanira, ganhíra,* HIND., PB.; *Karabi,* BENG.; *Kanhera, kanír,* BOMB.; *Diflí,* ARAB.; *Khar-zahrah* (the Asses-bane), PERS.

A common bush, with large pink or white flowers. **Dr. Stocks** says of this plant: "It is worthy of remark that the camel eats the **Nerium odorum** (*Zowr* or *jowr*), a remarkably poisonous plant, which in nearly every case proves fatal to him, as troops during the march have often found." Several officers have reported this same fact in connection with the high death-rate of camels during the Afghan campaign. Speaking of this subject, however, **Veterinary Surgeon Steel** discredits the idea of the camel eating poisonous plants, and says: "We observe that delicate appreciation of wholesome diet by means of the olfactory powers, which strongly argues against the probability of camels voluntarily eating poisonous herbs, as was suspected by some, when the mortality was so great at Quetta." (Compare with **Acorus**).

8. **Othonnopsis intermedia,** *Boiss.;* COMPOSITÆ.

Vern.—*Gúngú,* PUSHTU.

Mr. J. H. Lace, of the Forest Department, Quetta, reports that the Bíluchís regard this plant as poisonous to the camel.

9. **Peganum Harmala,** *Linn.;* RUTACEÆ.

Vern.—*Harmal,* ARAB.; *Isband,* PERS.; *Spelane, karmal,* PB.; *Isband,* HIND.

A small bush, much branched and densely clothed with dissected leaves. The whole plant strongly scented.

The camel will not eat this plant.

10. **Withania coagulans,** *Dunal;* SOLANACEÆ.

Vern.—*Akrí, panír,* PB.; *Panír,* SIND; *Panír bad,* PERS.

While this species is not eaten by camels, the allied species, **W. somnifera,** is said to be browsed by goats, and it is possible it may therefore be also eaten by camels. Both species occur in Sind, the Panjáb, and are distributed to Afghánistan. (*Co. Nos. 1 and 7.*)

CAMEL-FLESH AND PRICES PAID FOR THE ANIMAL.

It is stated by writers on the subject that camel-flesh is very tough, but that the flesh of the sucking camel is passable. The camel owners are reported to kill and eat the animals that show signs of dying, and that only the rich during festive occasions can afford to kill a young camel. In India the price of a full-grown camel seems to average from R25 to R150. At Taskand a camel sells for about £6 to £10, and this price prevails over the greater part of Turkistan. **Palgrave**, speaking of the Nejdean camels, says, the "camel is somewhat slimmer and smaller than the northern, and the hair is finer. They are cheaper in proportion than sheep; twenty-five to thirty shillings is an average price."

CAMEL-HAIR.

The amount of hair or wool which the camel possesses seems to be inversely to the warmth of the country in which it is found. The two-humped camel has a longer and more abundant crop than the single-humped, and the wild camel most of all. It has already been stated that the natives near Lob-nor are said to hunt the wild camel on account of its hair, which is much valued for its softness. The single-humped camel, acclimatised to colder regions, loses its hair when brought into a warm country, but periodically all camels cast their hair, and the natives either wait for this or clip the hair shortly before the period at which it should be shed. This generally occurs in spring in Upper Asia, but not till May or June in India. The cold country camels yield as much as 12℔ of hair a year, but in India 2℔ is about the average. This is woven into the *boras* or sacks used by the camel-owners, but for this purpose it is usual to mix the camel-hair with goat-hair. It is also made into ropes. **Bellew** says it "is very highly prized for the manufacture of a superior kind of camlet" (*Kashmir and Kashgar, p. 348*). Both at the late Calcutta International and at the Colonial and Indian Exhibitions the Agra Jail exhibited carpets made entirely of camel-hair. **Baden Powell** says: "The soft under-wool is of a light-brown colour; it is made into *chogas* of a cheap kind, but they are soft, warm, and useful. The long hair is not made use of" in India, but "it is employed in Europe for making paint-brushes." In the manufacture of artists' hair-brushes or pencils, in addition to camel-hair the fine hairs of the sable, the miniver, the martin, the badger, and the polecat are also employed.

CAMEL-HIDE.

There seems to be little or no export trade from India in camel-hide. Locally it is employed for many minor purposes, such as the fastenings used by the camel drivers. With the hair on, it is also manufactured both in Europe and in India into trunks. The chief use to which it is put in India, however, is the manufacture of *kuppas*, or the huge skin jars employed in India for carrying oil or *ghí*. These are most probably made in the Lower Provinces (where the camel does not occur), of cow, buffalo, or horse hide, but the writer can discover no account of the manufacture of the immense number of skin or leathern oil jars which form an almost characteristic feature of every bazár in Lower India. It is difficult to believe that these are not made locally, but the only published descriptions of the *kuppa* industry refer to the manufacture of vessels from camel-hide as practised in Central India, Rajputana, and the Panjáb. It would, however, appear that other skins are sometimes employed in addition to camel-hide, but as they are more expensive and more difficult to work, camel-hide is mainly used. The smaller ornamental jars employed for the household supply are, however, chiefly made of the intestinal integuments of the camel, cow, or horse. For this purpose the integuments are boiled until they are reduced to a glutinous skin or gluey mass. In both cases the vessel is formed in the same manner. Clay is taken and formed into the shape and size of the desired vessel. After this it is sun-dried to a desired extent. The fresh camel-hide freed from the hair, or the prepared ntestinal membrane, is then drawn over the mould and beaten until it firmly adheres. The mouth is now formed by working the skin around a stick or bamboo and reflecting the lip in the characteristic shape. When quite dry the clay is broken up and carefully removed. The smaller jars or *kuppi* are also ornamented with patterns cut out in white parchment; after these have been stuck on, the vessels are varnished over the outside. **Mr. Baden Powell**, in his *Panjáb Manufactures*, says that at Rohtak the *kuppi* are often made in "fantastic shapes, some like jugs, others flattened and perforated apparently with large holes, which of course can open only longitudinally in the thin flat body of the vase." They are also largely made at Maghiana in the Jhang district and at Bikánír in Rajputáná, and at Cutch and Ahmedabad in Bombay.

Kuppas may be of any desired size, the price varying accordingly. The larger sizes used by the merchants for holding oil, *ghí*, molasses, &c., are often "so large as easily to realize the familiar oil jars in the story of Ali Baba and the forty thieves" (*Baden Powell*). They may be made to hold one maund or six or eight maunds, but *kuppi* not more than sufficient to contain two ounces may also be procured.

Kuppas should not be mistaken for leather water bottles such as those made at Bikánír and used all over Northern India. Camel-skins sell for about R2 to R3 a piece.

CAMEL'S MILK.

It is scarcely necessary to enlarge on this subject further than has already been done. It is regularly used by the camel-rearers; indeed, it forms an important item of their food. To those not accustomed to it, it is purgative, and is accordingly recommended as a medicine. It is supposed to give strength to horses, hence is commonly given to foals. According to some writers camel's milk will yield butter-milk but not butter, and by others it is said to afford butter also. The writer has at present no means of settling this point, but a matter of this nature might easily enough be disposed of and thus remove at least one of the numerous ambiguities that exist in the literature of the camel.

Halwa, a kind of sweet-meat made of camel's milk and honey, is brought from the Persian Gulf to India *viá* Bombay. Formerly this used to come in flat earthen plates, but it is now done up in tin boxes and is even sold by European provision store-keepers in India, so that a considerable trade seems to be done in the article, although it does not appear to be anywhere made in India. It is known in the bazars as *muscat-ka-halwa*.

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